

hexafluoropropylene copolymer having an oxygen-containing group rather than to use a modified polyvinylidene fluoride having an oxygen-containing group.

The amount of the binder contained in the positive electrode is preferably 1 to 10 parts by weight per 100 parts by weight of the positive electrode active material.

As the binder of the negative electrode, a modified polyvinylidene fluoride having an oxygen-containing group and having a molecular weight of 100,000 to 1,000,000 can be used. In view of the bonding property of the negative electrode with the separator layer, an ionomer containing at least one of an acrylate unit and methacrylate unit, and a particulate rubber containing an acrylonitrile unit, a styrene unit and a butadiene unit are preferable.

As the above ionomer, a polymer containing an ethylene unit and an acrylate unit is preferable, for example.

The above particulate rubber preferably contains an acrylate unit such as a 2-ethylhexyl acrylate unit in addition to an acrylonitrile unit, a styrene unit and a butadiene unit.

The amount of the binder contained in the negative electrode is preferably 0.5 to 10 parts by weight and more preferably 1 to 3 parts by weight per 100 parts by weight of the negative electrode active material.

FIG. 1 is a cross sectional view of an example of a flat-type polymer battery. A battery case 1 is composed of a laminate film of an aluminum foil and resin films. An

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TOP SECRET 24660

insulating tape 2 made of polypropylene fixes a positive electrode lead and a negative electrode lead. A positive electrode lead 3 made of aluminum is connected to a positive electrode 4. A separator 5 comprising a gel electrolyte is interposed between the positive electrode 4 and a negative electrode 6. The negative electrode 6 is connected with a negative electrode lead 7 made of copper.

The positive electrode 4 is prepared as follows: a positive electrode mixture is applied onto a positive electrode current collector made of an aluminum foil, and the resultant plate is dried, rolled and cut to a prescribed size, and the positive electrode lead is welded thereto. The positive electrode mixture is prepared, for example, by dispersing a mixture of a lithium-cobalt complex oxide as the positive electrode active material and acetylene black as an electrically conductive agent into an NMP solution of a modified vinylidene fluoride-hexafluoropropylene copolymer having an oxygen-containing group.

The negative electrode 6 is prepared as follows: a negative electrode mixture is applied onto a negative electrode current collector made of a copper foil, and the resultant plate is dried, rolled and cut to a prescribed size, and the negative electrode lead is welded thereto. The negative electrode mixture is prepared, for example, by dispersing a graphite as the negative electrode active material into an NMP solution of a modified vinylidene

09972158-100901

fluoride having an oxygen-containing group.

FIG. 1 shows a flat-type battery having a wound-up electrode assembly as a typical example. However, it is also possible to use a folded-type electrode assembly, a laminate-type electrode assembly and the like.

Next, the present invention will be described specifically with reference to examples.

#### EXAMPLE 1

A flat-type polymer battery as shown in FIG. 1 was produced by using a lithium-cobalt complex oxide ( $\text{LiCoO}_2$ ) as the positive electrode active material and a graphite as the negative electrode active material.

First, a mixture of  $\text{LiCoO}_2$  and acetylene black mixed at a ratio by weight of 90:10 was dispersed in an NMP solution of a modified polyvinylidene fluoride having an oxygen-containing group (MKB manufactured by ATOFINA CHEMICALS Inc., average molecular weight: 500,000) as a binder to prepare a positive electrode mixture. This positive electrode mixture was applied onto both surfaces of a current collector of an aluminum foil, dried, rolled, and cut to a prescribed size and welded to a positive electrode lead, thereby to give a positive electrode.

Next, a graphite powder was dispersed in the same NMP solution of the modified polyvinylidene fluoride as used in the positive electrode to prepare a negative electrode mixture.